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| 2 BIOLOGY AND PHYSIOLOGY OF FINGERPRINTS | Page 1 of 2 |
| <div style="text-align: center;"> Division of Forensic Science LATENT FINGERPRINTS TRAINING MANUAL </div> | Amendment Designator: |
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| <div style="text-align: center; margin-top: 20px;"> 2 BIOLOGY AND PHYSIOLOGY OF FINGERPRINTS </div> <p>2.1 PURPOSE</p> <p>To acquaint and familiarize the student with the nature of friction ridge skin; ridge characteristics; anatomy of the hands and feet; general chemical composition of sweat and latent fingerprint residue, and to provide the student with sufficient practical knowledge in these subjects to aid the student in understanding future lessons in the training program.</p> <p>2.2 OBJECTIVES</p> <p>2.2.1 The student will attain:</p> <ul style="list-style-type: none"> • An understanding of the biological significance of friction skin ridge patterns, their formation and general considerations involved in ridge surface areas. • An understanding of basic anatomy and terminology of the hands and feet as applicable to identification techniques and practices. • An understanding of the general chemical composition of human sweat as a means of understanding the composition of latent print residue. <p>2.3 GOAL</p> <p>2.3.1 Upon completion of this segment of the training program the student will possess knowledge and understanding of fundamental concepts that will complement many phases of subsequent training, especially chemical composition of latent print residues and the origin of the usual substances present therein.</p> <p>2.4 DISCUSSION</p> <p>2.4.1 The friction skin ridges on the hands and feet can be grouped into three basic individual characteristics:</p> <ul style="list-style-type: none"> - Dots - Ridge endings (or ending ridges) - Bifurcations or the splitting of a ridge into two or more ridges <p>2.4.2 Many different sets of definitions are assigned to variations of the three basic characteristics listed above. Most of these variations involve mere semantics. Others involve arbitrary and subjective interpretation of combinations of the above three characteristics. Individual characteristics or points of identification were for many years referred to as Galton details. Professional improvement in the science of fingerprints and modern evaluation of the terminology involved has dwindled the original number of ten Galton details down to three (and sometimes five).</p> <p>2.4.3 An examiner that professes a definitive and objective distinction between combinations of the three characteristics listed above may be "hard-put" to defend his interpretations if ardently tested. The following are two extreme examples of potential pitfalls:</p> <p>2.4.3.1. If an examiner were asked to evaluate and classify individual characteristics in a large inked palm print area containing hundreds (perhaps more than two thousand) of individual characteristics, it would be very difficult to consistently differentiate in an objective manner on different occasions.</p> <p>2.4.3.2 On the witness stand an examiner could be asked to draw a short ridge and then an independent ridge that is just longer than a short ridge. The attorney might next draw a ridge that is half-way between the two ridges in length. Each time you "successfully" differentiate between a short ridge and an independent ridge he may again draw one half-way (in length) between the two until you arrive at a nebulous variation of hundredths of an inch which would probably not seem objective to the members of the court.</p> | |

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| 2 BIOLOGY AND PHYSIOLOGY OF FINGERPRINTS | Page 2 of 2 | |
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| <p>2.4.4 The composition of latent print residue is such that chemical techniques can effectively be used to process impressions on most porous surfaces, as well as some non-porous ones. The eccrine or sweat glands on the human body are most concentrated on the palmar surfaces of the hands and the soles of the feet. Secretions from the eccrine glands consist of 99.0% to 99.5% water and 0.5% to 1.0% percent solids. The solids consist of about one-half organic substances and one-half inorganic salts. Sodium chloride is the most prevalent salt present and of the organic substances, alpha-amino acids are important for latent print chemical processing purposes.</p> <p>2.4.5 The oils and fats which are present in latent print residue are primarily the results of sebum secreted by the sebaceous glands. Sebaceous glands are most concentrated on the nose, external ear, mons veneris and scrotum, but are not present on the palmar surfaces of the hands nor the plantar surfaces of the feet. The oily and fatty deposits present in latent print residue are generally the results of contaminants present on the hands from contact with other areas of the body, usually the face. Slight contamination of the palmar surfaces with oils and fats naturally occurs by the flow of sebum from the forearms and dorsal surface of the hands to the palms.</p> <p>2.5 EXAMINATION</p> <p>2.5.1 Successful completion of this segment of training will be determined by a written test.</p> <p>2.6 REFERENCES FOR TOPIC II</p> <ol style="list-style-type: none"> 1. <u>Fingerprint Techniques</u>, Moenssens, Chapters 2 and 11. 2. <u>Criminalistics: Introduction to Forensic Science</u>, Saferstein, Pgs. 440-443. 3. <u>Fingerprint Handbook</u>, Fields, Chapter 2. 4. <u>Fingerprints, Palms and Soles</u>, Cummins and Midlo, Chapters 2 and 8 through 16. 5. <u>Scott's Fingerprint Mechanics</u>, Olsen, Chapter 1. 6. <u>Fingerprints</u>, RCMP, Book 1, Pgs. 11-31. 7. Topic II Latent Print Section Reference Article File. | | |